Module 2: Short questions

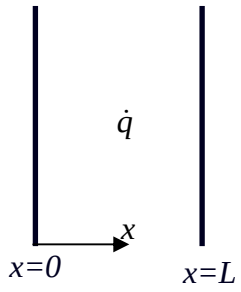
1. How does transient heat transfer differ from steady state heat transfer?

2. What is meant by the term “one-dimensional” when applied to conduction heat transfer?

3. What is meant by thermal resistance? Under what assumptions can the concept of thermal resistance be applied in a straightforward manner?

4. For heat transfer through a single cylindrical shell with convection on the outside, there is a value for the shell radius for a nonzero shell thickness at which the heat flux is maximized. This value is
   (A) k/h
   (B) h/k
   (C) h/r
   (D) r/h

5. The steady temperature profile in a one-dimensional heat transfer across a plane slab of thickness L and with uniform heat generation, $\dot{q}$, has one maximum. If the slab is cooled by convection at $x = 0$ and insulated at $x = L$, the maximum occurs at a value of x given by



   (A) 0
   (B) $\frac{L}{2}$
   (C) $\frac{\dot{q}}{k}$
   (D) L

6. Consider a cold canned drink left on a dinner table. Would you model the heat transfer to the drink as one-, two-, or three-dimensional? Would the heat transfer be steady or transient? Also, which coordinate system would you use to analyse this heat transfer problem, and where would you place the origin?

7. Consider a round potato being baked in an oven. Would you model the heat transfer to the potato as one-, two-, or three-dimensional? Would the heat transfer be steady or transient? Also, which coordinate system would you use to analyse this heat transfer problem, and where would you place the origin?

8. Consider an egg being cooked in boiling water in a pan? Would you model the heat transfer to the egg as one-, two-, or three-dimensional? Would the heat transfer be steady or transient? Also, which coordinate system would you use to analyse this heat transfer problem, and where would you place the origin?